

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A mold component configured for use with a base mold in a closed molding process to form a fiber-reinforced composite part, the mold component comprising:

a flexible body structure including a perimeter region and an interfacing surface, at least a portion of the interfacing surface configured to contact the part disposed on the base mold, and the flexible body structure having integrally formed therewith:

one or more resin distribution channels extending across the interfacing surface; one or more vacuum distribution channels extending across the interfacing surface; and

~~one or more~~ a plurality of perimeter seals defining one or more vacuum distribution channels therebetween and extending from the perimeter region for sealing engagement with the base mold to enclose the part between the body structure and the base mold; and

one or more vacuum output ports in fluid communication with said interfacing surface vacuum distribution channels and said perimeter seal vacuum distribution channels thereby providing a first vacuum across said interfacing surface and an independent second vacuum along said perimeter seals.

2. (canceled)

3. (canceled)

4. (previously presented) The mold component of claim 1, further comprising:
a standoff extending from the interfacing surface of the body structure; and
a plurality of passages formed in the standoff to facilitate fluid communication between the one or more resin distribution channels and an enclosed space formed

between the body structure and the base mold where the fiber reinforced composite part may be formed.

5. (previously presented) The mold component of claim 1, wherein the flexible body structure is constructed of materials selected from the group consisting of polyurea, polyurethane, and a polyurea/polyurethane compound, and formed by spraying the material on a pattern.

6. (previously presented) The mold component of claim 5, wherein the material is further selected from the group consisting of an aliphatic, aromatic and polyaspartic compound.

7. (original) The mold component of claim 1, wherein the one or more perimeter seals comprise a grid of sidewall flanges.

8. (previously presented) The mold component of claim 1, wherein the body structure further comprises first regions formed at the resin or vacuum distribution channels having increased rigidity as compared to the remainder of the body structure.

9. (original) The mold component of claim 8, wherein the first regions include a reinforcing material bonded with the body structure.

10. (previously presented) The mold component of claim 1, wherein the body structure is formed of one or more materials thereby providing regions in the body structure with different physical properties.

11. (previously presented) The mold component of claim 10, the physical properties being selected from the group consisting of density, rigidity, compression, elongation, and combinations thereof.

12. (currently amended) The mold component of claim 1, further comprising; one or more resin input ports extending through the body structure and in fluid communication with at least one of the one or more resin distribution channels; and

~~one or more vacuum output ports extending through the body structure and in fluid communication with at least one of the one or more vacuum distribution channels.~~

13. (previously presented) A mold component configured for use with a base mold in a closed molding process to form a fiber-reinforced composite part, the mold component comprising:

a flexible unitary body structure formed by spraying material selected from the group consisting of polyurea, polyurethane, and polyurea/polyurethane on a pattern, said body structure including a perimeter region and an interfacing surface, at least a portion of the interfacing surface configured to contact the part disposed on the base mold, and the flexible body structure having integrally formed therewith:

one or more distribution channels extending across the interfacing surface;
and one or more perimeter seals extending from the perimeter region for sealing engagement with the base mold to enclose the part between the body structure and the base mold.

14. (original) The mold component of claim 13, wherein the one or more perimeter seals comprise a plurality of perimeter seals extending downward from the unitary body and defining a vacuum distribution channel therebetween.

15. (original) The mold component of claim 13, wherein the one or more distribution channels comprise:

one or more resin distribution channels; and
one or more vacuum distribution channels.

16. (original) The mold component of claim 15, wherein at least a portion of the interfacing surface is configured to contact the part disposed on the base mold, the mold component further comprising:

a standoff extending from the interfacing surface of the unitary body; and
a plurality of passages formed in the standoff to facilitate fluid communication between the one or more resin distribution channels and an enclosed space formed between the unitary body and the base mold where the fiber reinforced composite part may be formed.

17. (previously presented) The mold component of claim 13, wherein the material is further selected from the group consisting of an aliphatic, aromatic and polyaspartic compound.

18. (original) The mold component of claim 13, wherein the one or more perimeter seals comprises a grid of sidewall flanges.

19. (original) The mold component of claim 13, wherein the unitary body further comprises first regions formed at the one or more distribution channels having increased rigidity as compared to the remainder of the body structure.

20. (original) The mold component of claim 19, wherein the first regions include a reinforcing material bonded with the unitary body.

21. (previously presented) The mold component of claim 13, wherein the unitary body is formed of one or more materials thereby providing regions in the unitary body with different physical properties.

22. (previously presented) The mold component of claim 21, the physical properties being selected from the group consisting of density, rigidity, compression, elongation, and combinations thereof.

23. (currently amended) The mold component of claim 13, further comprising:
one or more resin input ports extending through the unitary body and in fluid communication with at least one of the one or more resin distribution channels; and

one or more vacuum output ports extending through the unitary body and in fluid communication with at least one of ~~the one or more~~ said interfacing surface vacuum distribution channels and said perimeter seal vacuum distribution channels thereby providing a first vacuum across said interfacing surface and an independent second vacuum along said perimeter seals.

24. (currently amended) In a closed molding system for forming a fiber-reinforced composite part, the system including an A surface mold tool and a B surface mold tool, the improvement comprising:

the B surface mold tool comprising a flexible body structure formed by spraying material selected from the group consisting of polyurea, polyurethane, and polyurea/polyurethane on a pattern, said body structure including a perimeter region and an interfacing surface, at least a portion of the interfacing surface configured to correspond to and contact the part disposed on the A surface mold tool, and the flexible body structure having integrally formed therewith:

one or more resin distribution channels extending across the interfacing surface; one or more vacuum distribution channels extending across the interfacing surface; and

one or more perimeter seals extending from the perimeter region for sealing engagement with the base mold to enclose the part between the body structure and the base mold.

25. (canceled)

26. (previously presented) The system of claim 24, further comprising:

a standoff extending from the interfacing surface of the body structure; and

a plurality of passages formed in the standoff to facilitate fluid communication between the one or more resin distribution channels and an enclosed space formed between the body structure and the A surface mold tool where the fiber-reinforced composite part may be formed.

27. (canceled)

28. (previously presented) The system of claim 24, wherein the B surface mold tool is formed of one or more materials thereby providing regions in the B surface mold tool having different.

29. (previously presented) The system of claim 28, wherein the physical properties are selected from the group consisting of density, rigidity, compression, elongation, and combinations thereof.

30. (previously presented) The system of claim 24, further comprising:

one or more resin input ports extending through the body structure and in fluid communication with at least one of the one or more resin distribution channels; and

one or more vacuum output ports extending through the body structure and in fluid communication with at least one of the one or more vacuum distribution channels.

31. (previously presented) A process involving closed molding tooling techniques to form a fiber-reinforced composite part against a base mold with a flexible body structure having an interfacing surface upon which one or more resin distribution channels and one or more vacuum distribution channels are formed and extend thereacross, and one or more perimeter seals, the process comprising:

placing a fiber lay up on the base mold;

moving the body structure onto the base mold such that the fiber lay up is covered by the interfacing surface of the body, thereby forming an enclosed space between the body structure and the base mold, the fiber lay up being located in the enclosed space; and

drawing a first vacuum through the enclosed space thereby urging the resin to travel through the resin distribution channels and across and through the fiber lay up generally in the directions of the first vacuum draw to thereby form the composite part upon curing; and drawing a second vacuum at one or more perimeter seals to cause the one or more perimeter seals to sealingly engage the base mold.

32. (original) The process of claim 31, wherein the body structure is formed substantially of a material selected from the group consisting of polyurea, polyurethane and a polyurea/polyurethane compound.

33. (original) The process of claim 31, wherein the one or more perimeter seals comprise a plurality of perimeter seals extending downward from the body structure and defining a vacuum distribution channel therebetween.

34. (original) The process of claim 31, wherein the one or more distribution channels comprise:

one or more resin distribution channels; and
one or more vacuum distribution channels.

35. (original) The process of claim 34, further comprising:

a standoff extending from the interfacing surface of the body structure; and
a plurality of passages formed in the standoff to facilitate fluid communication between the one or more resin distribution channels and the enclosed space.

36. (previously presented) The process of claim 31, wherein the body structure further comprises first regions formed at the resin or vacuum distribution channels having different physical properties as compared to the remainder of the body structure.

37. (previously presented) The process of claim 36, the physical properties being selected from the group consisting of density, rigidity, compression, elongation, and combinations thereof.

38. (original) The process of claim 36, wherein the first regions include a reinforcing material bonded with the body structure.

39. (previously presented) The process of claim 31, wherein resin is dispensed into the enclosed space through one or more resin input ports extending through the body structure, and the first vacuum is drawn through the enclosed space through one or more vacuum output ports extending through the body structure.

40. (currently amended) A process of forming a boat hull involving closed molding tooling techniques to form a fiber-reinforced composite part against a base mold with a flexible body structure having an interfacing surface corresponding to the shape of said composite part upon which one or more resin distribution channels and one or more vacuum distribution channels are formed and extend thereacross, and one or more perimeter seals, the process comprising:

forming a reusable unitary integral body structure by spraying material selected from the group consisting of polyurea, polyurethane, and polyurea/polyurethane on a pattern;

placing a fiber lay up on the base mold;

applying resin to the fiber lay up;

moving the unitary integral body structure onto the base mold such that the fiber lay up/resin combination is covered by the interfacing surface of the unitary integral body structure; and

drawing a vacuum through an enclosed space between the base mold and the interfacing surface to cause the one or more perimeter seals to sealingly engage the base mold, the interfacing surface of the unitary integral body structure to urge the fiber lay up to be shaped to the base mold, and the resin to travel through the one or more resin distribution channels and across and through the fiber lay up generally in the direction of the vacuum draw to thereby form the composite part upon curing.

41. (canceled)

42. (currently amended) A mold component configured for use with a base mold in a closed molding process to form a fiber-reinforced composite part, the mold component comprising:

a flexible body structure formed by spraying material selected from the group consisting of polyurea, polyurethane, and polyurea/polyurethane on a pattern, said body structure, said body structure including a perimeter region and an interfacing surface, at least a portion of the interfacing surface configured to correspond to and contact the part disposed on the base mold, and the flexible body structure having integrally formed therewith:

one or more resin distribution channels and one or more vacuum distribution channels extending across the interfacing surface;

a plurality of perimeter seals extending from the body structure for

sealing engagement with the base mold to enclose the part between the body structure and the base mold and wherein at least two of the perimeter seals define a vacuum distribution channel therebetween; and

one or more vacuum output ports in fluid communication with said interfacing surface vacuum distribution channels and said perimeter seal vacuum distribution channels thereby providing a first vacuum across said interfacing surface and an independent second vacuum along said perimeter seals.

43. (canceled)

44. (currently amended) The mold component of claim 41 ~~43~~, wherein at least a portion of the interfacing surface is configured to contact the part disposed on the base mold, the mold component further comprising:

a standoff extending from the interfacing surface of the body structure;

and

a plurality of passages formed in the standoff to facilitate fluid communication between the one or more resin distribution channels and an enclosed space formed between the body structure and the base mold where the fiber-reinforced composite part may be formed.

45. (previously presented) The mold component of claim 42, wherein the flexible body structure is formed of a material selected from the group consisting of polyurea, polyurethane, and a polyurea/polyurethane compound.

46. (previously presented) The mold component of claim 42, wherein the material is further selected from the group consisting of an aliphatic, aromatic and polyaspartic compound.

47. (previously presented) The mold component of claim 42, wherein the perimeter seals comprise a grid of sidewall flanges.

48. (previously presented) The mold component of claim 42, wherein the body structure further comprises first regions formed at the one or more distribution channels having increased rigidity as compared to the remainder of the body structure.

49. (previously presented) The mold component of claim 48, wherein the first regions include a reinforcing material bonded with the body structure.

50. (previously presented) The mold component of claim 42, wherein the body structure is formed of one or more materials thereby providing regions in the body structure with different physical properties.

51. (previously presented) The mold component of claim 50, the physical properties being selected from the group consisting of density, rigidity, compression, elongation, and combinations thereof.

52. (previously presented) The mold component of claim 42, further comprising:
one or more resin input ports extending through the body structure and in fluid communication with at least one of the one or more resin distribution channels;
and
one or more vacuum output ports extending through the body structure and in fluid communication with at least one of the one or more vacuum distribution channels.

53. (currently amended) A mold for use in a closed molding process to form a fiber-reinforced composite part, the mold comprising:

a base mold; and

a flexible unitary body corresponding in shape to said composite part and formed by spraying material selected from the group consisting of polyurea, polyurethane, and polyurea/polyurethane on a pattern, said body structure having first and second perimeter seals and having first and second vacuum distribution channels separated by the second perimeter seal, said first and second perimeter seals being engageable with a base mold to form a first sealed area therebetween with a first vacuum port communicating with the first sealed area, and the second perimeter seal adapted to form a second sealed area with the base mold with a second vacuum port communicating therewith.

54. (currently amended) A mold component configured for use with a base mold in a closed molding process to form a fiber-reinforced composite part, the mold component comprising:

a flexible unitary body having a seal at the perimeter of a member with an interfacing surface wherein the flexible unitary body is spray-formed of one or more materials selected from the group consisting of polyurea and polyurethane to form an integral flexible and reusable unitary body.

55. (currently amended) A mold configured for use in a closed molding process to form a fiber-reinforced composite part, the mold comprising:

a base mold having an interfacing-molding first surface and a seal engaging surface; and

a flexible unitary molded body having a perimeter seal and an integrally-formed reusable member formed from polyurethane with an interfacing-molding second surface, said second surface having a portion formed ~~during molding~~ to conform to a corresponding portion of the first surface.

56. (canceled)